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- 1. A method for identifying a drug candidate for promoting tissue-specific differentiation of a stem cell, the method comprising the steps of:
- (A) providing a library of test substances, the library comprising at least a first test substance and a second test substance, the first and second test substances having different molecular structures;
- (B) providing an in vitro culture of stem cells, the culture being divided into at least a first subculture and a second subculture;
- (C) contacting the first subculture with the first test substance and the second subculture with the second test substance;
- (D) culturing the first and second subcultures respectively contacted with the first and second test substances under conditions that would promote tissue-specific differentiation of the stem cells if an agent that promoted tissue-specific differentiation was in contact with the stem cells; and
- (E) analyzing the cells in the first and second subcultures for increased tissuespecific gene expression.
 - 2. The method of claim 1, wherein the stem cells are embryonic stem cells.
- 3. The method of claim 2, wherein the embryonic stem cells are mammalian embryonic stems cells.
- 4. The method of claim 3, wherein the mammalian embryonic stem cells are murine embryonic stems cells.
- 5. The method of claim 4, wherein the murine embryonic stem cells R1 embryonic stems cells.

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- 1 6. The method of claim 3, wherein the mammalian embryonic stem cells are human embryonic stems cells. 2
 - 7. The method of claim 1, wherein the conditions that would promote tissuespecific differentiation of the stem cells comprises culturing the first and second subcultures in a differentiating medium.
 - 8. The method of claim 1, wherein the conditions that would promote tissuespecific differentiation of the stem cells comprises culturing the first and second subcultures at about 37°C.
 - 9. The method of claim 1, wherein the conditions that would promote tissuespecific differentiation of the stem cells comprises culturing the first and second subcultures in a humidified, carbon-dioxide containing incubator.
 - 10. The method of claim 1, wherein the conditions that would promote tissuespecific differentiation of the stem cells comprises culturing the first and second subcultures for a time period of at least five days.
 - 11. The method of claim 10, wherein the time period is at least seven days.
- 1 12. The method of claim 11, wherein the time period is between seven and 2 eighteen days.
- 1 13. The method of claim 1, wherein the first and second subcultures are cultured 2 in a microtiter plate.

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	14.	The method of claim 1, wherein the step (E) of analyzing the cells in the firs
and second subcultures for increased tissue-specific gene expression comprises isola		
	mRNA from the first and second subcultures.	

- 15. The method of claim 14, wherein total cellular RNA is isolated from the first and second subcultures.
- 16. The method of claim14, wherein the step (E) further comprises reverse-transcribing the mRNA to create cDNA.
- 17. The method of claim 1, wherein the step (E) of analyzing the cells in the first and second subcultures for increased tissue-specific gene expression comprises performing a polymerase chain reaction (PCR).
- 18. The method of claim 14, wherein the isolated mRNA is immobilized on a substrate.
- 19. The method of claim 18, wherein the substrate is contacted with a probe that specifically hybridizes to the tissue-specific mRNA.
- 20. The method of claim 1, wherein the step (E) of analyzing the cells in the first and second subcultures for increased tissue-specific gene expression is performing using gene chip technology.

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